

City of Seattle

LEED Portfolio Analysis

January – December 2008 Projects



Prepared for:
City Green Building
Department of Planning and Development

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Prepared by: Paladino and Company

EXECUTIVE SUMMARY

January - December 2008 Projects

Introduction

This report is an analysis of a portfolio of LEED Certified Buildings within the City of Seattle. The objective of this study is to evaluate the impacts of these innovative green buildings on the City's infrastructure and resources. The documentation provided to the USGBC for certification has been analyzed to produce a series of reports or profiles on anticipated savings in transportation, water, energy, carbon and waste for these projects.

The City of Seattle City Green Building Program is interested in tracking the projected savings for LEED credits that impact the City utilities and the City sustainability goals. The goals of the study are to:

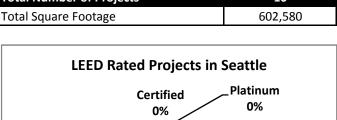
- Understand the LEED credit performance of Seattle buildings
- Identify the most commonly implemented sustainable design strategies

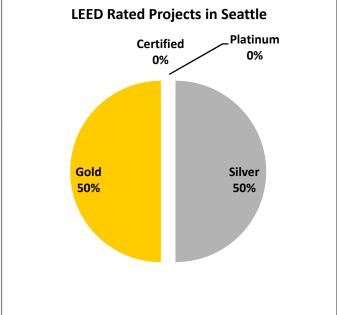
Reports are generated based on a set of parameters (such as date of certification or building owner) and results are shown for the filtered group of buildings. The filtering parameter is shown on the upper left corner of each report sheet.

This sheet is the Executive Summary, which shows a summary of the determined portfolio of buildings. Projects certified under three different LEED ratings systems within Seattle City limits are included in this report: LEED-NC (v2.1 and v2.2), LEED-CS (v2.0), and LEED-CI (v2.0). The individual report sheets are divided to show the analysis of LEED-NC and LEED-CI projects on the right hand side. This distinction is made because of the significant differences between these ratings systems. At the bottom of each report sheet is an bold box that provides a Combined Environmental Summary, which calculates the total summary of relevant information from all three ratings systems.

LEED Portfolio Summary

Number of NC/CS Projects	6
Number of CI Projects	4
Total Number of Projects	10
Total Square Footage	602,580





LEED Ratings

Certified	0
Silver	5
Gold	5
Platinum	0

Portfolio Environmental Savings Summary

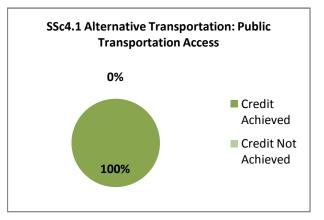
Categories	Savings
Sustainable Sites	
Public Transportation Access	See Report
Total Bicycle Racks Provided	139
Total Preferred Parking Spaces for Alternative Fuel Vehicles	3
Total Preferred Parking Spaces for Carpools/Vanpools	228
Total Annual Stormwater Runoff Reduction (gallons)	604,930
Stormwater Management - Treatment	See Report
Water Efficiency	
July Irrigation Water Savings (gallons)	96,230
Annual Wastewater Savings (gallons)	255,090
Annual Potable Water Savings (gallons)	1,352,390
Energy and Atmosphere	
Annual Energy Savings (kBtu)	5,307,360
Annual Renewable Energy (kWh)	5,870
Annual Green Power Purchased (kWh)	4,671,700
(CO ₂) Emission Savings (lbs)	1,327,690
Materials and Resources	
Total Construction Waste Diverted (tons)	10,280
Total Value of Recycled Content Materials	\$3,967,570

ALTERNATIVE TRANSPORTATION: PUBLIC TRANSPORTATION ACCESS

January - December 2008 Projects

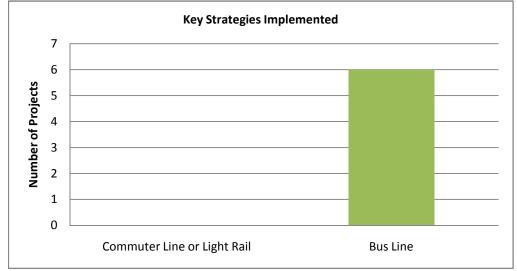
LEED Credits Analyzed LEED-NC SSc4.1 LEED-CS SSc4.1 LEED-CI SSc3.1 **Introduction** Achievement of these credits reduces pollution and land development impacts from automobile use by locating projects close to public transportation (bus or light rail). This analysis evaluates the percentage of projects achieving the credits and the modes of public transportation available.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	6
Total Number of Projects	6



LEED-CI v2.0

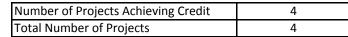
SSc3.1 Alternative Transportation: Public

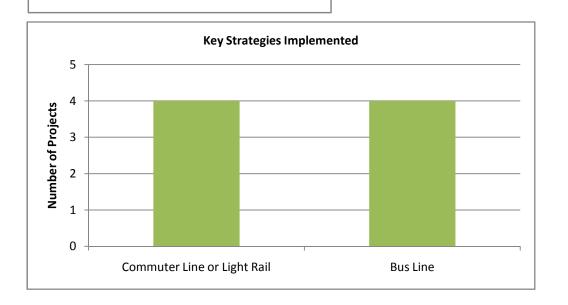
Transportation Access

0%

100%







Credit

Achieved

■ Credit Not

Achieved

COMBINED ENVIRONMENTAL SUMMARY

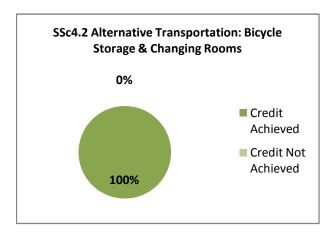
Number of Projects Achieving Credit	10
Total Number of Projects	10

ALTERNATIVE TRANSPORTATION: BICYCLE STORAGE & CHANGING ROOMS

January - December 2008 Projects

LEED Credits Analyzed LEED-NC SSc4.2 LEED-CS SSc4.2 LEED-CI SSc3.2 **Introduction** Achievement of these credits reduces pollution and land development impacts from automobile use by providing bicycle storage and changing rooms to promote bicycle commuting. This analysis evaluates the percentage of projects achieving the credits and the number of bicycle racks provided.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0

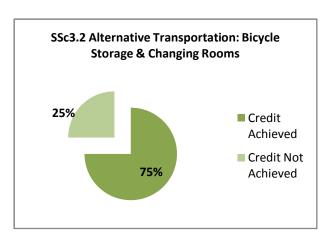


KEY FINDINGS

Number of Projects Achieving Credit

Total Number of Projects	6
Total Bike Parking Spaces Added	115
Average Number of Bike Parking	19
Spaces/Project	19
Average Percent Bike Racks/FTE	16%
Total Number of Showers Added	10
Average Number of Showers/Project	2

LEED-CI v2.0



KEY FINDINGS

Number of Projects Achieving Credit	3
Total Number of Projects	4
	•

Total Bike Parking Spaces Added	24
Average Number of Bike Racks/Project	6
Average Percent Bike Racks/FTE	17%
Total Number of Showers Added	5
Average Number of Showers/Project	2

COMBINED ENVIRONMENTAL SUMMARY

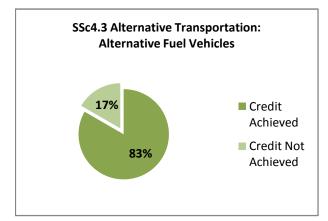
Number of Projects Achieving Credit	9	
Total Number of Projects	10	
Total Bike Parking Spaces Added	139	
Average Number of Bike Racks/Project	15	
Total Number of Showers Added	15	
Average Number of Showers/Project	2	

ALTERNATIVE TRANSPORTATION: ALTERNATIVE FUEL VEHICLES

January - December 2008 Projects

LEED Credits Analyzed LEED-NC SSc4.3 LEED-CS SSc4.3 **Introduction** Achievement of these credits reduces pollution and land development impacts from automobile use by providing alternative fuel vehicles for use by building occupants or amenities for alternative fuel vehicles owned by occupants (preferred parking stalls, charging stations, etc.). This analysis evaluates the percentage of projects achieving the credits, the strategies implemented and the total number of preferred parking stalls provided for alternative vehicles.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0

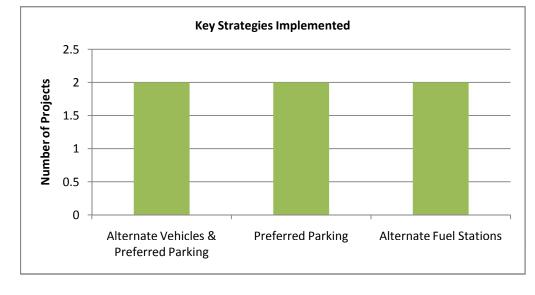


KEY FINDINGS

Number of Projects Achieving Credit	5
Total Number of Projects	6

Total Number of Parking Spaces *	228
Total Number of Preferred Parking	3
Spaces for Alternative Fuel Vehicles *	3

^{*} This value does not represent data from all projects (data was missing for several projects)



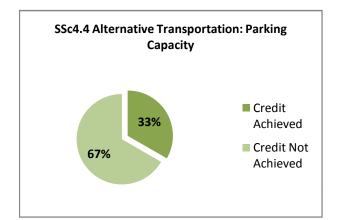
LEED-CI v2.0

ALTERNATIVE TRANSPORTATION: PARKING CAPACITY

January - December 2008 Projects

LEED Credits Analyzed LEED-NC SSc4.4 LEED-CS SSc4.4 LEED-CI SSc3.3 Introduction Achievement of these credits reduces pollution and land development impacts from automobile use by reducing the overall number of parking spaces provided and providing preferred carpool/vanpool parking spaces for a percentage of the parking spaces or occupants of the building. Commercial and residential projects can also achieve these credits by providing no new parking. Residential projects can alternately achieve the credits by providing infrastructure and support programs (carpool drop-off areas, car-share services, ride boards, shuttles, etc.) to facility shared vehicle usage. This analysis evaluates the percentage of projects achieving the credits, the strategies used and the total number of preferred parking stalls provided for carpools/vanpools.

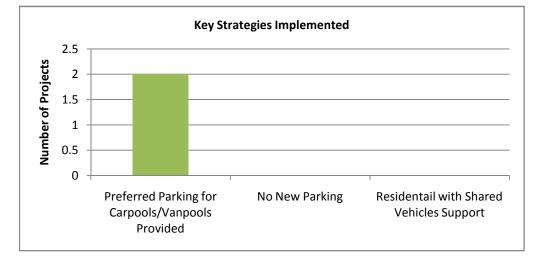
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



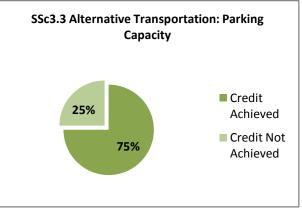
KEY FINDINGS

Number of Projects Achieving Credit	2
Total Number of Projects	6
Total Number of Parking Spaces *	228
Total Number of Preferred Parking	5
Spaces for Carpools/Vanpools *	3

* This value does not represent data from all projects (data was missing for several projects)



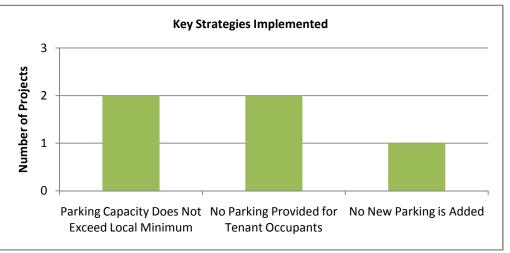
LEED-CI v2.0



KEY FINDINGS

Number of Projects Achieving Credit	3
Total Number of Projects	4
Total Number of Parking Spaces *	5
Total Number of Preferred Parking	2
Spaces for Carpools/Vanpools *	2

* This value does not represent data from all projects (data was missing for several projects)



COMBINED ENVIRONMENTAL SUMMARYNumber of Projects Achieving Credit5Total Number of Projects10Total Number of Parking Spaces233Total Number of Preferred Parking Spaces for Carpools/Vanpools7

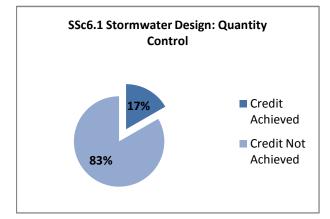
STORMWATER DESIGN: QUANTITY CONTROL

January - December 2008 Projects

LEED Credits Analyzed LEED-NC SSc6.1 LEED-CS SSc6.1 Introduction Achievement of these credits limits disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration and managing stormwater runoff.

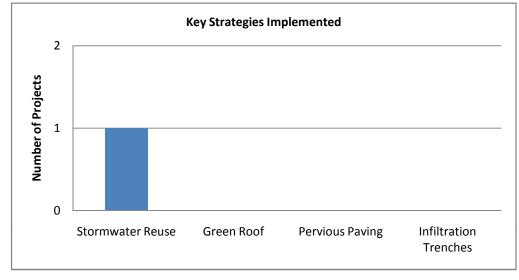
Compliance paths vary depending on percentage of existing imperviousness, but all require calculations to demonstrate reduced stormwater runoff or calculations to demonstrate a stream channel protection strategy that protects receiving stream channels from excessive erosion. This analysis evaluates the percentage of projects achieving the credits, categorizes the strategies implemented, and estimates the total stormwater runoff quantity reduction (in gallons per year).

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	1
Total Number of Projects	6
Total Annual Stormwater Reduction (gallons)	604,936
Average % Reduction in Stormwater Runoff	33%



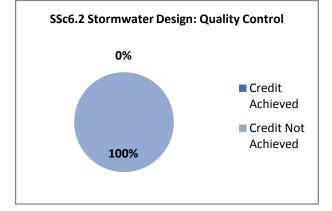
LEED-CI v2.0

STORMWATER DESIGN: QUALITY CONTROL

January - December 2008 Projects

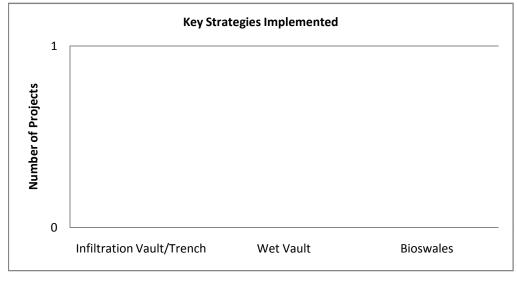
LEED Credits Analyzed LEED-NC SSc6.2 LEED-CS SSc6.2 Introduction Achievement of these credits reduces water pollution by reducing impervious cover, increasing on-site infiltration and removing contaminants. These credits require the implementation of a stormwater management plan that treats stormwater runoff and reduces post-development total suspended solids (TSS) in stormwater runoff. Projects achieving this credit in LEED NC 2.0 and 2.1 also require the reduction of total phosphorous (TP) in runoff. This analysis evaluates the percentage of projects achieving the credits and categorizes the strategies implemented.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	0
Total Number of Projects	6



LEED-CI v2.0

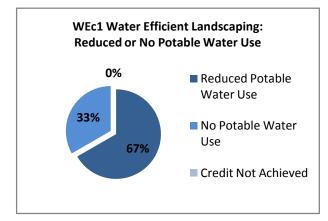
WATER EFFICIENT LANDSCAPING: REDUCED OR NO POTABLE WATER USE

January - December 2008 Projects

LEED Credits Analyzed LEED-NC WEc1 LEED-CS WEc1

Introduction Achievement of these credits limits or eliminates the use of potable water for landscape irrigation through the use of efficient irrigation systems, native plantings, and xeriscaping. This analysis evaluates the percentage of projects achieving the credits, estimates the average percentage reduction in irrigation water by LEED rated projects and the total irrigation water savings for the month of July (in gallons). The analysis also categorizes the strategies implemented.

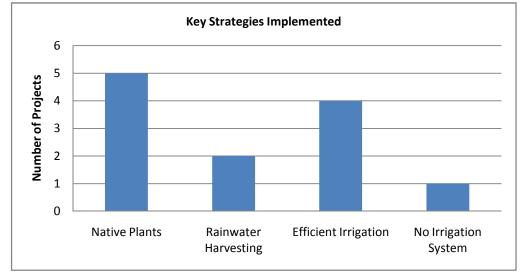
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	6
Total Number of Projects	6

Average % Reduction in Irrigation Water Use	83%
Total July Irrigation Water Savings (gallons)	96,232



LEED-CI v2.0

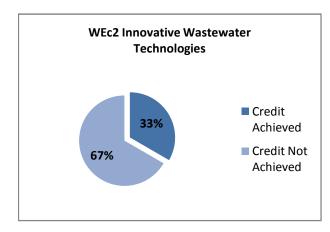
INNOVATIVE WASTEWATER TECHNOLOGIES

January - December 2008 Projects

LEED Credits Analyzed LEED-NC WEc2 LEED-CS WEc2

Introduction Achievement of this credit results in a reduction in the generation of waste water and potable water demand by reducing the quantity of potable water required for toilets and urinals. Methods for credit achievement include the use of high efficiency fixtures and/or the substitution of non-potable water for wastewater. This analysis evaluates the percentage of projects achieving the credit and estimates the total waste water savings (in gallons per year).

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Reuse

Number of Projects Achieving Credit	2	
Total Number of Projects	6	
Average Baseline -	4.66	
Wastewater/Capita/Day (gallons)	4.66	
Average LEED Projects -	1.66	
Wastewater/Capita/Day (gallons)	1.66	
Total Annual Wastewater Savings	255.004	
Achieved by LEED Projects (gallons)	255,094	
Number of Projects with Greywater		

1

LEED-CI v2.0

^{*}Baseline water use calculations in LEED is based on EPACT

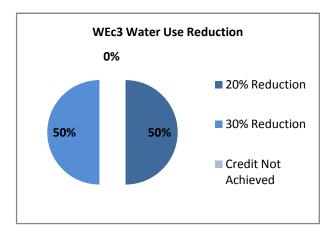
WATER USE REDUCTION: WATER EFFICIENT INDOOR PLUMBING FIXTURES

January - December 2008 Projects

LEED Credits Analyzed LEED-NC WEc3
LEED-CS WEc3
LEED-CI WEc1

Introduction Achievement of these credits maximizes water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems by demonstrating water savings over a baseline building that meets the Energy Policy Act fixture performance requirements. This analysis evaluates the percentage of projects achieving the credits and estimates the total water savings (in gallons per year) and the average percentage of water savings by LEED rated projects. The analysis also categorizes the strategies implemented and estimates water saved by each strategy (in gallons per year).

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



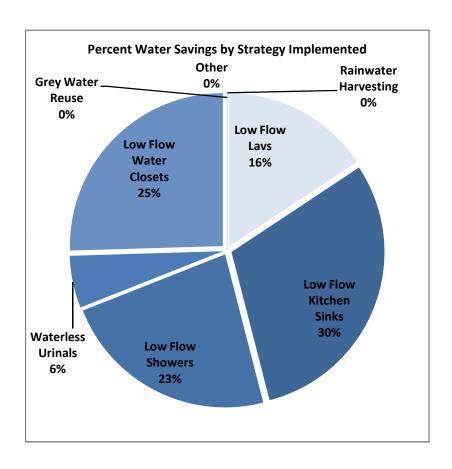
KEY FINDINGS

Projects (gallons)

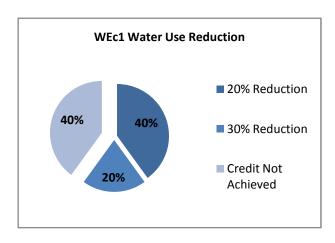
Number of Projects Achieving Credit	6
Total Number of Projects	6
Average Baseline - Water	17.41
Use/Capita/Day (gallons)	
Average LEED Projects - Water	10.87
Use/Capita/Day (gallons)	
Average Annual Water Savings Achieved	18%
by LEED Projects	16%

1,224,576

Total Annual Water Savings by LEED



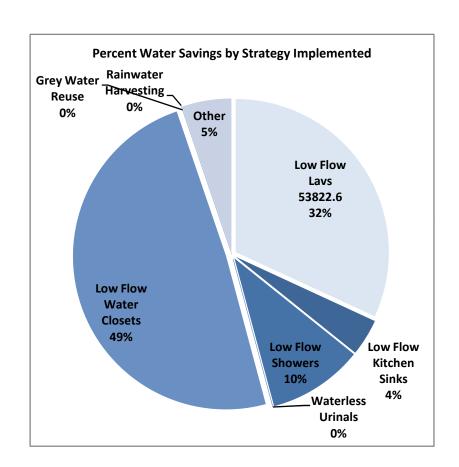
LEED-CI v2.0



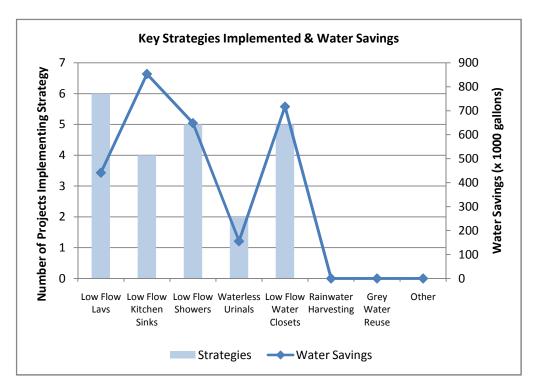
KEY FINDINGS

Number of Projects Achieving Credit	2
Total Number of Projects	4

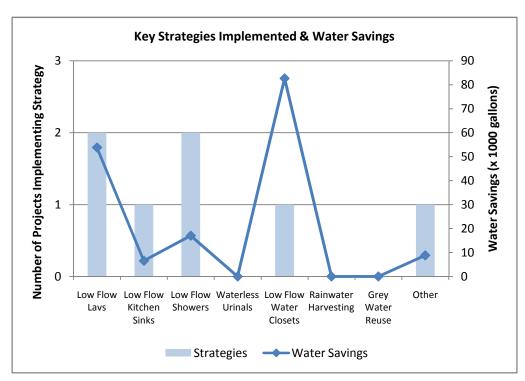
Average Baseline - Water	8.03
Use/Capita/Day	6.05
Average LEED Projects - Water	5.53
Use/Capita/Day	
Average Annual Water Savings Achieved	210/
by LEED Projects	31%
Total Annual Water Savings by LEED	127 010
Projects (gallons)	127,819



LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0







COMBINED ENVIRONMENTAL SUMMARY

Number of Projects Achieving Credit	8
Total Number of Projects	10
•	
Average Annual Water Savings Achieved by LEED	22%
Projects	2270
Total Annual Water Savings by LEED Projects	1 252 204
(gallons)	1,352,394

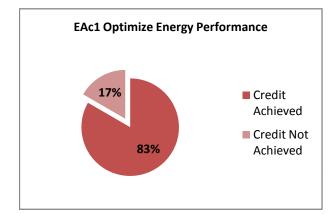
OPTIMIZE ENERGY PERFORMANCE

January - December 2008 Projects

LEED Credits Analyzed LEED-NC EAc1
LEED-CS EAc1
LEED-CI EAc1.1-1.4

Introduction Achievement of these credits reduces environmental impacts associated with excessive energy use. For LEED NC and CS projects, EAc1 is achieved either by demonstrating increasing levels of performance above an ASHRAE 90.1 baseline through a whole building energy simulation or by following prescriptive measures in the ASHRAE Advanced Energy Design Guide for Small Office Buildings or the Core Performance Guide. The analysis for LEED NC and CS evaluates the percentage of projects achieving the credits, estimates total annual electricity savings (in kWh) and gas savings (in therms), and reports the electricity and gas savings by end use. For LEED CI projects, four credits are available to demonstrate energy savings. The analysis for each LEED CI credit evaluates the percentage of projects achieving the credit and categorizes the compliance paths taken and strategies implemented.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

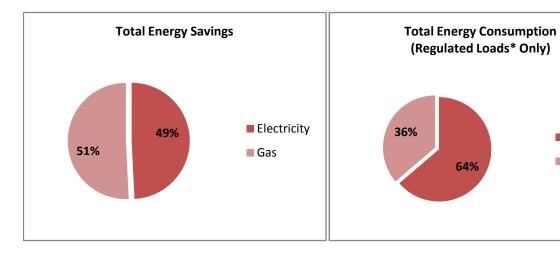
Number of Projects Achieving Credit	5
Total Number of Projects	6

Total Energy Savings Achieved (kBtu)	5,307,369
Total Annual Electricity Savings (kWh)	765,455
Total Gas Savings Achieved (Therms)	26,962
Total Process Loads (kWh)	1,184,827
Total Exterior Lighting (kWh)	

Annual Electricity Savings Energy Use Intensity (EUI) (kBtu/SF/Yr)	4.3
Gas Savings Energy Use Intensity (EUI) (kBtu/SF/Yr)	4.5
Total Annual Savings EUI	8.8

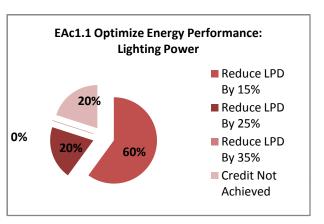
■ Electricity

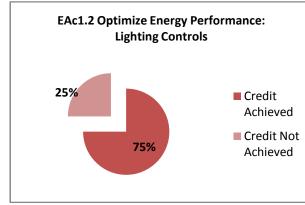
Gas

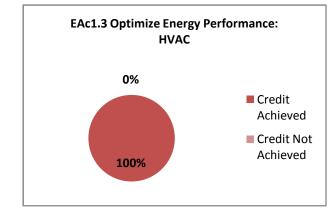


^{*} Regulated Loads are defined by ASHRAE

LEED-CI v2.0







KEY FINDINGS

Number of Projects Achieving Credit	4
Total Number of Projects	4

Total Lighting Power Density Savings	9.914
(watts)	3,514

KEY FINDINGS

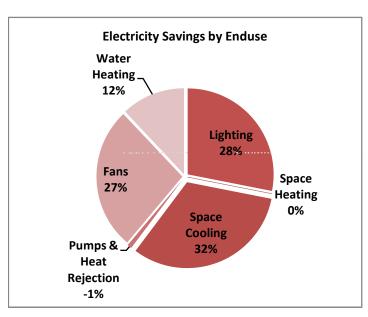
Number of Projects Achieving Credit	3
Total Number of Projects	4

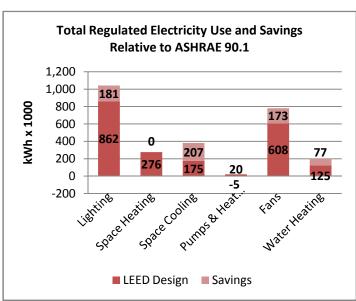
KEY FINDINGS

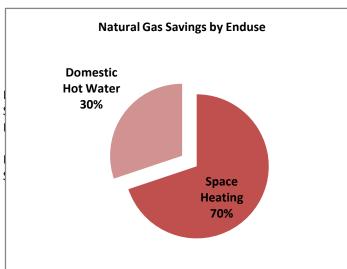
Number of Projects Achieving Credit	4
Total Number of Projects	4

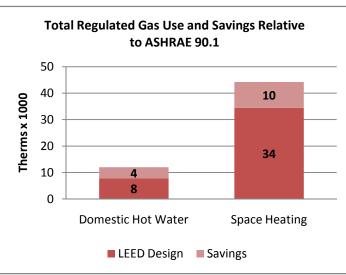


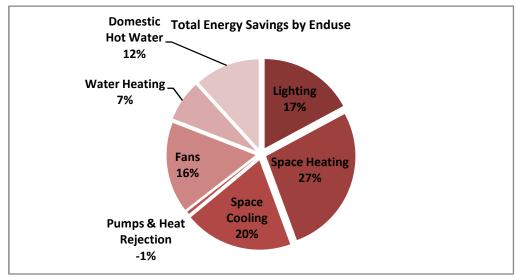
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



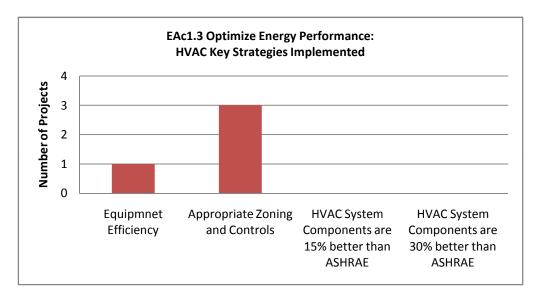








LEED-CI v2.0

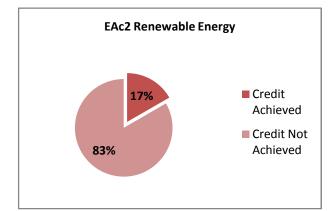


RENEWABLE ENERGY

January - December 2008 Projects

LEED Credits Analyzed LEED-NC EAc2 LEED-CS EAc2 **Introduction** Achievement of these credits reduces environmental impacts associated with fossil fuel energy use by supplying the building's energy use through on-site renewable energy systems. This analysis evaluates the percentage of projects achieving the credits, categorizes the strategies implemented and estimates the total renewable energy generated by projects that achieved this credit.

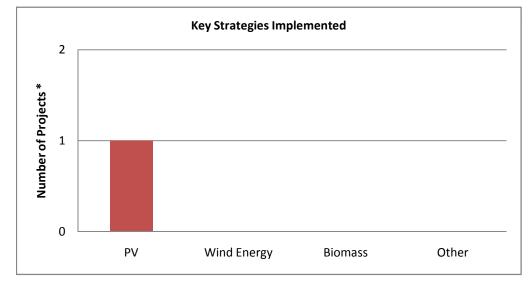
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	1
Total Number of Projects	6
Total Annual Renewable Energy (kWh) *	5,872
Average Annual % Total Building Energy L	6%

^{*} This value does not represent data from all projects (data was missing for several projects)



LEED-CI v2.0

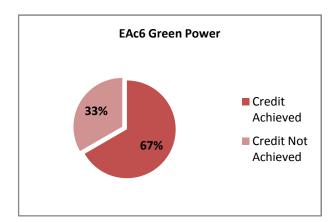
GREEN POWER

January - December 2008 Projects

LEED Credits Analyzed LEED-NC EAc6 LEED-CS EAc6 LEED-CI EAc4 **Introduction** Achievement of these credits promotes the development and use of grid-source, renewable energy technologies by requiring that at least a half of the building's electricity be sourced from a renewable energy source. This analysis evaluates the percentage of projects achieving the credits and estimates the total green power purchased (in kWh) by projects that achieved the credit.

EAc4 Green Power

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

Number of Projects Achieving Credit	4
Total Number of Projects	6
Total Annual Green Power Purchase (kWh)	2,883,271
Average Annual % Green Power (for 2 years)	166%

LEED-CI v2.0

■ Credit Achieved

■ Credit Not

Achieved

KEY FINDINGS

Number of Projects Achieving Credit	2
Total Number of Projects	4

Total Annual Green Power Purchase (kWh)	1,788,436
Average % Green Power	

COMBINED ENVIRONMENTAL SUMMARY

Number of Projects Achieving Credit	6
Total Number of Projects	10

Total Annual Green Power Purchase (kWh) 4,671,707

CARBON

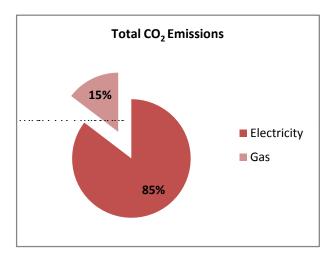
January - December 2008 Projects

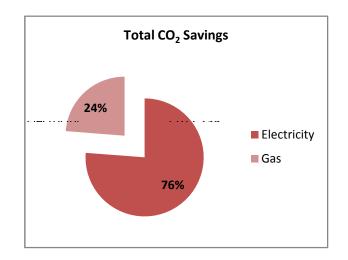
Introduction Information reported on this sheet reflects data provided for Energy & Atmosphere Credit 1. Converting electricity and gas use into CO₂ impacts illustrates their different contributions to atmospheric conditions. This report also shows the CO₂ emissions by end use, as reported for EAc1.

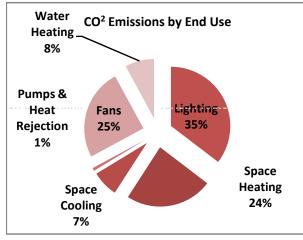
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0

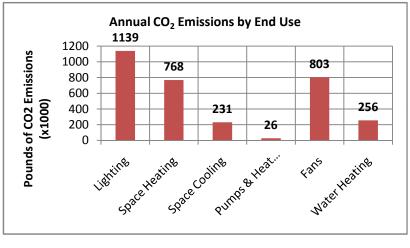
Total LEED Design Electricity Use (kWh)	2,177,301
Total LEED Design Gas Use (Therms)	42,217

	Emissions	Savings
Total LEED Design CO ₂ from Electricity (lbs)	2,879,263	1,012,238
Total LEED Design CO ₂ from Gas (lbs)	493,943	315,452
Total CO ₂	3,373,207	1,327,691









Conversion Assumptions

City of Seattle CO 2 Impact Values:

Electric Use 0.6 Metric Tons/MWH

Gas Use 11.7 lbs/Therm

General Conversions: 1 MWH = 1000 kWh 1 Metric Ton = 2204 lbs

LEED-CI v2.0

This information is not available for LEED-CI projects.

CONSTRUCTION WASTE MANAGEMENT: DIVERT FROM DISPOSAL

January - December 2008 Projects

LEED Credits Analyzed LEED-NC MRc2 LEED-CS MRc2 LEED-CI MRc2 Introduction Achievement of these credits diverts construction and demolition debris from disposal in landfills and incinerators, and promotes recycling and/or salvaging of non-hazardous construction and demolition waste. This analysis evaluates the percentage of projects achieving the credits, categorizes the waste stream, and estimates the amount of each stream of waste diverted (in tons) and total waste diverted (in tons) by LEED rated projects. The analysis also estimates the average construction waste diverted (in lbs/SF) and the average percentage of construction waste diverted.

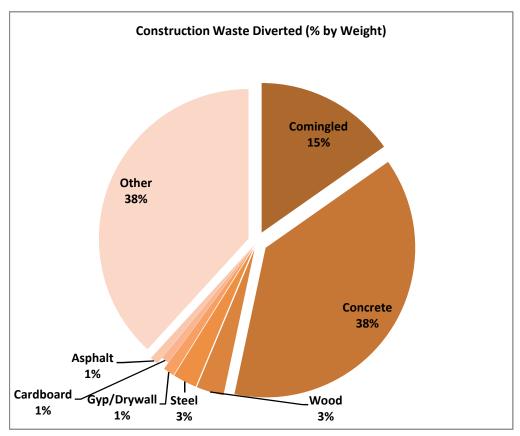
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



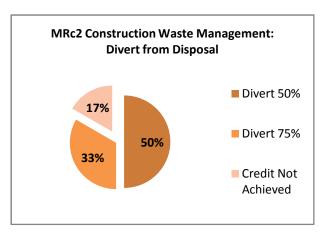
KEY FINDINGS

Number of Projects Achieving Credit	6
Total Number of Projects	6

Average % Rate of Construction Waste	000/
Diverted	88%
Average Construction Waste Generated	70.0
(lbs/SF)	70.0
Average Construction Waste Diverted	64.3
(lbs/SF)	64.3
Total Construction Waste Diverted	10,179
(tons)	10,179



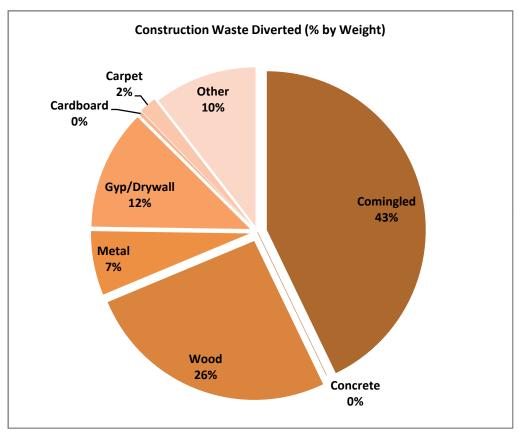
LEED-CI v2.0



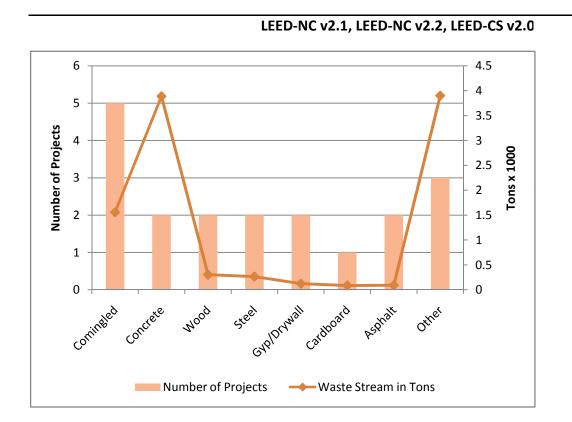
KEY FINDINGS

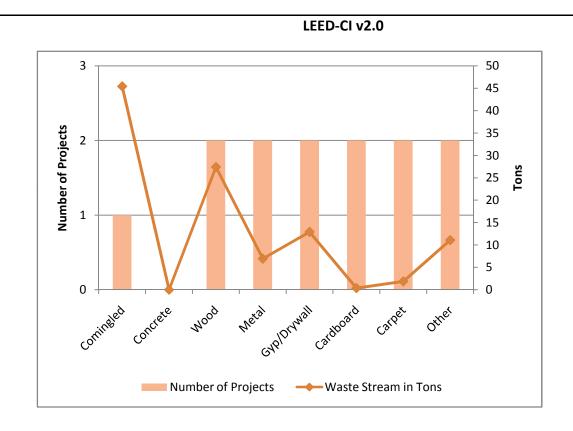
Number of Projects Achieving Credit	3
Total Number of Projects	4

Average % Rate of Construction Waste Diverted	90%
Average Construction Waste Generated (lbs/SF)	6.3
Average Construction Waste Diverted (lbs/SF)	5.7
Total Construction Waste Diverted (tons)	106.0









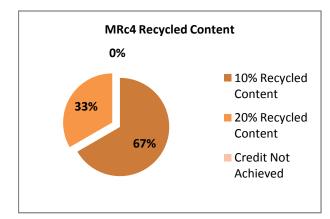
COMBINED ENVIRONMEN	NTAL SUMMARY
Number of Projects Achieving Credit	9
Total Number of Projects	10
Total Construction Waste Diverted (tons)	10,285

RECYCLED CONTENT

January - December 2008 Projects

LEED Credits Analyzed LEED-NC MRc4 LEED-CS MRc4 LEED-CI MRc4 Introduction Achievement of these credits reduces impacts resulting from extraction and processing of virgin materials by using building products that incorporate recycled content materials. This analysis evaluates the percentage of projects achieving the credits, categorizes the materials that incorporate recycled content and estimates the total recycled content value of each category. The analysis also estimates the total recycled content cost and the average value of recycled content as a percentage of total material cost for projects that achieved these credits.

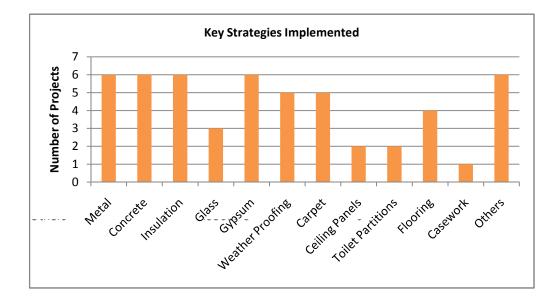
LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0



KEY FINDINGS

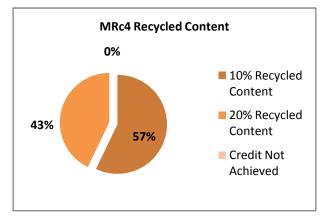
Number of Projects Achieving Credit	6
Total Number of Projects	6

Average % Recycled Content Materials	13%	
by Cost	15%	
Total Value of Recycled Content	¢2.770.102	
Materials	\$3,770,193	



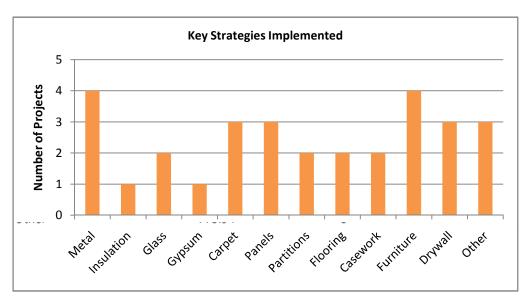
LEED-CI v2.0

KEY FINDINGS

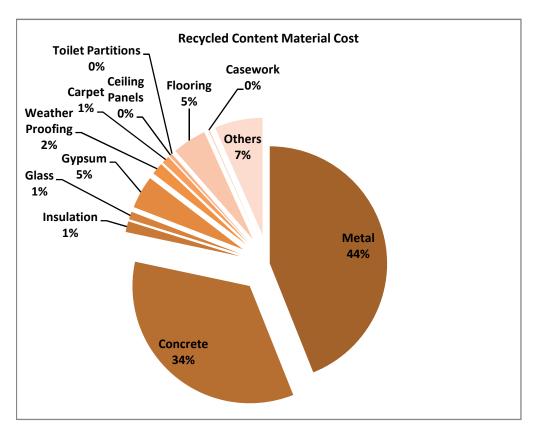


Number of Projects Achieving Credit 4 Total Number of Projects 4

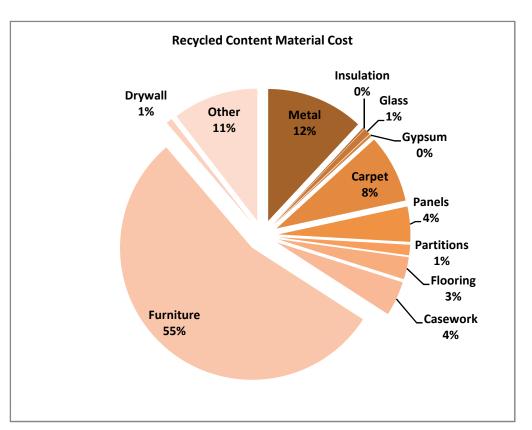
Average % Recycled Content Materials by Cost	17%
Total Value of Recycled Content Materials	\$197,380







LEED-CI v2.0



COMBINED ENVIRONMENTAL SUMMARY

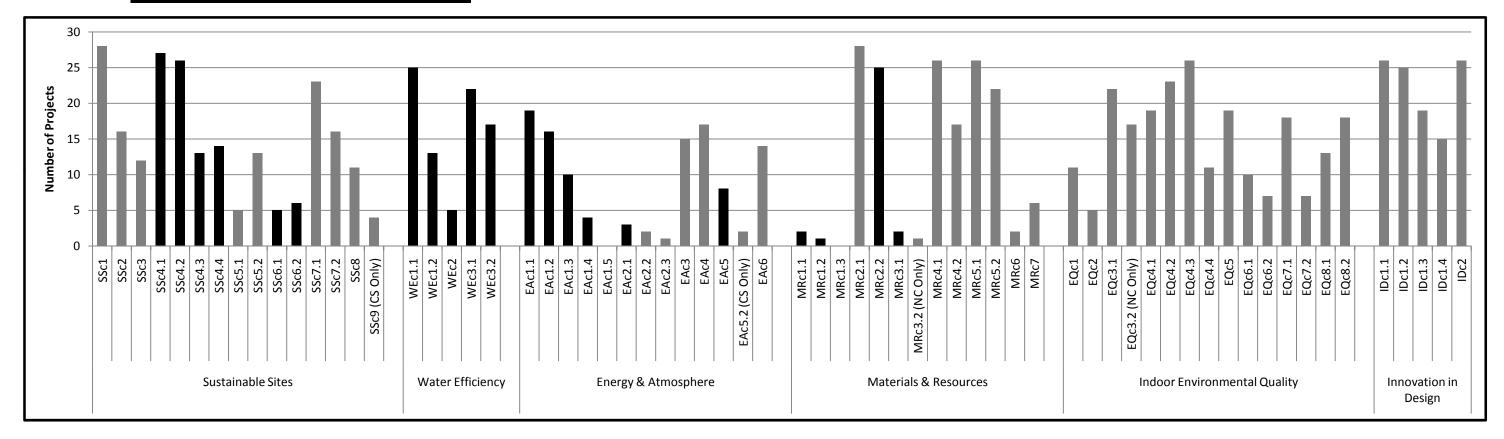
Number of Projects Achieving Credit	10
Total Number of Projects	10
Total Value of Recycled Content Materials	\$3,967,573

LEED NC/CS CREDIT SUMMARYNOT FILTERABLE INFORMATION

Introduction The bar chart shown below shows the number of projects which achieved each credit in the LEED NC and CS rating systems for all projects in the current database. (Note that, unlike other output tables and graphics in this spreadsheet tool, this table is not able to be filtered for a smaller project set.) Darker bars in the chart represent credits that are further analyzed in the spreadsheet tool. Lighter gray bars represent credits that have no further analysis.

LEED-NC v2.1, LEED-NC v2.2, LEED-CS v2.0

Total Number of NC/CS Projects	28
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LEED CI CREDIT SUMMARY

NOT FILTERABLE INFORMATION

Introduction The bar chart shown below shows the number of projects which achieved each credit in the LEED CI rating system for all projects in the current database. (Note that, unlike other output tables and graphics in this spreadsheet tool, this table is not able to be filtered for a smaller project set.) Darker bars in the chart represent credits that are further analyzed in the spreadsheet tool. Lighter gray bars represent credits that have no further analysis.

LEED-CI v2.0

Total Number of CI Projects	6
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